PROJECT SUMMARY

I. Introduction

A Construction Permit application has been submitted by ADM for an anaerobic wastewater treatment system. This project requires an air pollution control construction permit because it is a source of emissions.

Because ADM has requested that this project be permitted for significant increases in emissions of NO_x, CO, and SO_2, the project must comply with the requirements of 40 CFR 52.21: Prevention of Significant Deterioration of Air Quality (PSD) for these pollutants.

II. Project Description

ADM operates a grain processing complex in Decatur. The proposed Anaerobic Wastewater Treatment System will be located at ADM's East Plant, next to the wastewater treatment plant. This new treatment system will reduce the organic load on the existing aerobic lagoons. The new system will consist of four lagoons each covered by a floating membrane which will capture the byproduct biogas generated from the treatment process. The biogas, which is mostly methane, is formed by digestion of starch, sugar and other organic compounds in the wastewater. The membrane will have channels operating at negative pressure which forces the biogas to flow to the edges and out through stacks for control.

The control system will consist of a sulfur removal system (LO-CAT) followed by combustion, in either a flare or the existing seven fiber feed dryers. The LO-CAT system is a multi-stage control system consisting of a H_2S absorber and oxidizer. After being "cleaned" by the LO-CAT system, the sulfur content of the biogas will be less than 200 ppm sulfur, as H_2S.

The preferred disposition of the cleaned biogas is to the fiber dryers since this will reduce the amount of natural gas fired in these existing dryers. The project also provides for biogas to be flared in the event of disruption to the equipment to send biogas to the dryers.

Due to the potentially corrosive nature of biogas, changes will also be made to the existing fiber dryers consisting of replacing or modifying burners with an equal capacity burner that can handle the biogas. This project does not involve other physical changes to the mill, which are unrelated to the anaerobic system, that would increase the grain processing capacity.

III. Emissions

The emissions increases from this project are attributable to combustion emissions associated with the potential additional firing of biogas in the new flare. When firing biogas in the existing fiber dryers, no increase in NO_x, CO, PM/PM_{10} and VOM is expected. An increase of SO_2 attributable to the combustion of biogas in the existing fiber dryers is expected to be less than significant.

IV. Applicable Emission Standards

All emission sources in Illinois must comply with the Illinois Pollution Control Board's emission standards. The Board's emission standards represent the basic requirements for sources in Illinois. The Board has standards for sources of SO_2 and PM/PM_{10}. This project readily complies with all applicable Board standards.

V. BACT Requirements

This project is being permitted for significant increase in emissions of NO_x, CO and SO_2. As a result, BACT is required for NO_x, CO and SO_2 emissions at new units and existing units that would be physically modified and experience an increase for a pollutant.

BACT is determined on a case-by-case basis using a "top-down" procedure. The top-down procedure involves ranking available control technologies in descending order of control effectiveness. The top alternative is established as BACT unless this alternative is eliminated due to accompanying or energy, environmental, or economic impacts.

ADM submitted a BACT demonstration in its application reflecting its judgment as to the emission control technology and associated emission limits that should be considered BACT under the PSD rules for the slow-rate anaerobic wastewater treatment system. The Illinois EPA has reviewed the material submitted by ADM and made its independent determination of BACT. As explained below, the Illinois EPA concurred with ADM's selection of control technologies.

SO_2 Control Technology Selection

Combustion of biogas will convert all gaseous sulfur compounds contained in the biogas to SO_2. Because it is more effective to remove sulfur, i.e., H_2S, from a fuel gas stream prior to combustion than to scrub SO_2 from the combustion gases, only H_2S removal processes have been reviewed in detail. Specifically, the following technologies were evaluated: dry processes, liquid processes, membrane processes and biological processes. The available H_2S control technologies are similar as they are all capable of 99% control efficiency for H_2S, and will reduce H_2S content to 200 ppm given the loading in ADM's raw biogas.

However some technologies are more advantageous due to lower waste disposal requirements, lower chemical costs, lower capital costs, etc. This effects the type of project for which different technology is used.

The LO-CAT system, which is a liquid redox process, is able to achieve the same removal efficiency as other dry processes, liquid processes, membrane processes and biological processes. Important advantages of this system, as identified by ADM, are mature technology, minimal waste disposal, no toxic chemicals and it produces sulfur as a byproduct. Accordingly, the Illinois EPA finds ADM's selection for H_2S/SO_2 control technology acceptable.

NO_x and CO Control Technology Selection

For emissions of NO_x and CO, BACT is considered proper operation of the flare consistent with the requirements of the NSPS for flares. ADM considered selective catalytic reduction and selective non-catalytic reduction for NO_x emissions and catalytic oxidation for CO emissions, as control options but concluded they were not technically feasible, e.g., high rates of SO2 oxidation, catalyst poisoning, etc. The Illinois EPA concurs with this determination.

VI. Air Quality Analysis

An ambient air quality analysis was conducted by a consulting firm, RTP Environmental, on behalf of ADM to assess the impact of the emissions of the proposed project. Under the PSD rules, this analysis must determine whether the proposed project will cause or contribute to a violation of any applicable air quality standard.

The air quality analyses for NO_x, CO and SO_2 were performed using computerized dispersion modeling. The analyses conformed to the guidance and requirements of the USEPA and the Illinois EPA. The analyses indicate that this project will not cause a violation of the NO_x, CO, or SO_2 air quality standards or PSD increments. For NO_x, the predicted peak impact of the project is not significant, i.e., at most 0.04 micrograms per cubic meter ($\mu g/m^3$) annually compared to the standard of 100 $\mu g/m^3$. For CO, the project's peak impacts are at most 4.10 $\mu g/m^3$ 8-hour average and 10.83 $\mu g/m^3$ 1-hour average compared to the standards for CO of 10,000 $\mu g/m^3$ and 40,000 $\mu g/m^3$, respectively. For SO_2, the project's peak impacts are at most 0.03 $\mu g/m^3$ annual average, 0.37 $\mu g/m^3$ 24-hour average, and 1.07 $\mu g/m^3$ 3-hour average, compared to the standards for SO_2 of 80 $\mu g/m^3$, 365 $\mu g/m^3$, and 1,300 $\mu g/m^3$, respectively.

VII. Draft Permit

The conditions of the draft permit contain limitations and requirements to assure that this project will comply with all applicable Board emissions standards and achieve the Best Available Control Technology (BACT) as required by PSD.

The permit conditions also establish appropriate compliance procedures, including inspection practices, recordkeeping requirements, monitoring requirements and reporting requirements. The Permittee must carry out these procedures on an on-going basis to demonstrate that the new system is operating within the limitations set by the permit.

VIII. Request for Comments

It is the Illinois EPA's preliminary determination that the project meets all applicable state and federal air pollution control requirements, subject to the conditions proposed in the draft permit. The Illinois EPA is therefore proposing to issue a construction permit for this project.

Comments are requested on this proposed action by the Illinois EPA and the proposed conditions on the draft permit. If substantial public interest is shown in this matter, the Illinois EPA will consider holding a public hearing in accordance with 35 Ill. Adm. Code Part 166.

JMS: